



ey telescope
User Manual

3.0

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Seeing more with Eye&Telescope

Eye&Telescope ("E&T") is software for active deep sky observers and provides a variety of relevant practical data and information about the preparation, execution, and documentation of observations. The development of the program is focused on practical use and functionality, especially for nightly use at the telescope.

You can plan your observations with E&T in advance to make the most efficient use of limited time at the telescope. Instead of searching for a suitable star map or required object data under a beautiful clear sky, you spend your time at the eyepiece. Instead of wasting valuable observing time searching for an object that's not within the grasp of your optics, you'll know beforehand which objects are realistic targets.

E&T is for all active observers who want to "see more." It offers the following:

- Estimation of visibility with the optics used (telescope/eyepiece)
- Estimation of visibility according to viewing conditions (limiting magnitude)
- Possible observing times considering darkness and moonlight
- Favorable observing times when objects reach a predefined azimuth (if possible)
- Ability to display objects on star maps only if they are perceptible with your optics under the given observing conditions. This avoids cluttering the star maps with unattainable objects. Additionally you can look up specific objects or insert objects already displayed in other lists with drag-&-drop or the clipboard.
- Potentially visible neighborhood objects near an observing target. If you've ever been annoyed by having overlooked an interesting object near an observed target, then this function is for you.
- Objects already observed are specified in star maps, observing projects, and the logbook to document the progress of your observing projects.
- Catalog data such as name, type, position, brightness, and others for more than 130,000 deep-sky objects

This manual primarily shows the various options in E&T and highlights of its practical use. If you'd like to find out more about the program's operation or the meaning of individual parameters, the help file installed with E&T is at your disposal and can be opened with <F1> whenever the program is running.

E&T doesn't require that you adhere to a predefined planning process. The centerfold figure illustrates how the individual modules collaborate. To make the first steps easier for you, an exemplary use scenario is presented in the section "Which objects can you see with your telescope."

As the program's author, I encourage you to investigate the various possibilities for navigation and data trans-

fer that E&T offers. The topic is extended to other programs in the section "How does E&T cooperate with other software."

E&T makes substantial use of the right mouse button. The *context menus* allow for quick navigation and data transfer between different windows. Simply check out which functions are available here.

Installation and Licensing

E&T uses database components ("MDAC" by Microsoft), which are already packaged in newer Windows installations. For the operation of E&T with Windows 95, Windows 98, Windows ME, or Windows NT 4.0, MDAC 2.5 or a later version suitable for your operating system must be separately installed if E&T shows a corresponding message when starting. You'll find more information on this at the E&T website (www.eyetelescope.com). E&T can work with telescope controls that support the ASCOM standard. If you want take advantage of this capability, install the current version of the ASCOM software (download at www.ascom-standards.org).

To install E&T, just put the program DVD into the drive. The installation will start automatically.

To protect the program against boot-

legging, E&T incorporates a secure license mechanism. Every license is delivered with an individual serial number and must be personalized for unlimited use. Oculum Publishing generates a license code from the serial number and your name. This license code ties the serial number to your name and prevents the proliferation of unauthorized copies, because you log in under the licensing specified name.

Initially, E&T asks for the serial number and the license data. The automatically opened help file explains all the details.

Having licensed E&T, you should back-up the license data. To do this, click on the ? in the toolbar, and under About E&T click on the "Save license data" button in the info dialog. E&T writes the license data into a text file which you should print and keep safe.

Three tours to become familiar with E&T

In the help file there are three "tours" showing typical use scenarios of the software:

- Tour 1 describes the estimation of an object's perceptibility with an example and introduces possibilities for an observing plan.
- Tour 2 shows how the interplay between object filtering and observing project shows which Messier objects can be observed

during the upcoming night.

- Tour 3 shows how star maps, object information, and logbook work together to support you during a spontaneous, unplanned observing session.

If you take these tours, you'll get a good overview of the program's functions and operation, and you'll find the answers to most questions of practical relevance.

Registering your data

Once you've installed and licensed E&T, you should enter data on your optics (telescopes or binoculars), eyepieces, and observing site. This only needs to be done once. Of course, you can add new items (vacation site, new eyepiece ...) or delete outdated items any time.

The corresponding input dialogs can be found in the `User Data` menu. If you need an explanation about a field to be filled out or selected, click on the field to select it and then press `<F1>`. The help system opens and displays a suitable explanation.

Preparing for observations

Which objects can you see with your optics?

All observing plans begin with the question of which objects you'd like to see and whether you can see them with your optics. Whether a deep sky object is discernible in a telescope depends on the light grasp of the optics, the darkness of the sky, the acuity of the observer, and the size and brightness of the object. E&T takes all these factors into account to determine detectability.

The perceptibility of objects with very small angular size (appearing practically point-like) is determined by the limiting magnitude of the optics. In this case, high magnification results in an improvement in the limiting magnitude.

The perceptibility of extended objects is determined by the contrast between the surface brightness of the object and the sky background. Depending on the apparent angular size of the object (determined by the eyepiece in use) and the brightness of the sky background, the human vision system requires a certain minimum contrast (the *contrast threshold*) for successful detection. The difference between the contrast threshold and the object/background contrast is called *contrast*

above threshold ("CAT"), which serves as a practical measure of perceptibility. (For further explanation, please see the help file under the keywords "contrast above threshold").

The contrast above threshold is then used by E&T as a minimum value to select observable objects from a database and represent them in list form or on star maps. The tool for this purpose is the *object filter* of E&T.

To investigate which objects are generally attainable with your telescope, you open a new object filter with the `File . New` command. The object filter offers selection criteria for objects in three dialog boxes. The first box, "Objects," offers static selection criteria that only depend on the properties of the objects themselves (with the exception of the limiting magnitude determined by the optics). The dialog boxes for the dynamic filter criteria of perceptibility ("Sky and optics") and current visibility ("Time and site") can be turned off. To pass the filter, an object must fulfill all given and (activated!) filter criteria. If the filter criteria are adjusted such that no objects would pass or certain object types would be left out unintentionally, E&T prompts you with a corresponding message.

In the "Objects" box, choose object types that appear extended (and thus *contrast above threshold* is applicable): open clusters, globular clusters, planetary nebulae, galactic nebulae, and galaxies. For the constellations, select All. You may also specify a minimum diameter for the objects (in arc minutes). The other settings can be left unchanged.

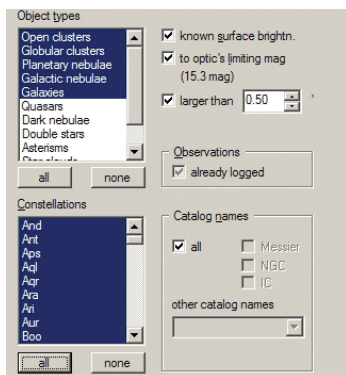


Fig. 1: Settings in "Objects"

Select the optics and the estimated naked-eye limiting magnitude at the observing site in the dialog box "Sky and optics." The setting "close to limit" in the Perceptibility options (equivalent to a contrast above threshold of 0) completes the filter criteria. To enable the criteria for perceivability, check the "Sky and optics active" box.

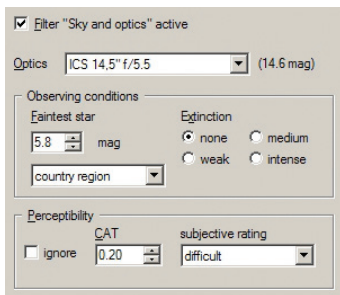


Fig. 2: Settings in "Sky and optics"

We now select the observing site in the dialog box "Time and site" and choose an observing night. E&T displays the rising and setting times of Sun and Moon as well as the period of darkness (no twilight, no Moon in the sky) in the "Events" group. To take visibility criteria into account, check the "Time and site active" box. Note that the Moon occasionally shines all night long, and then no night length is given. In such a case the filter does not find *any* objects.

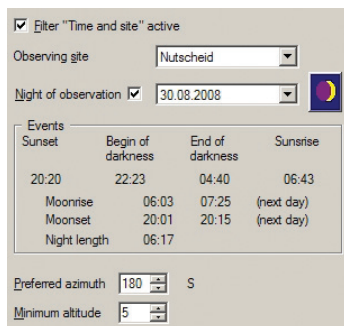


Fig. 3: Settings in "Time and site"

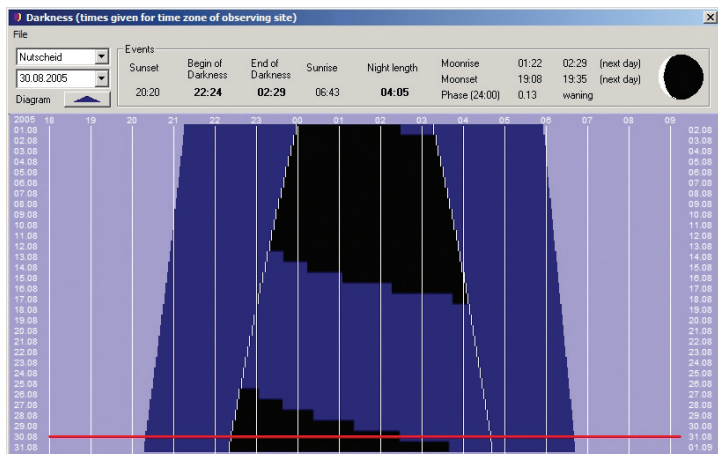


Fig. 4: Darkness and moonlight

A detailed darkness situation overview can be opened (with an optional graphic representation) by clicking on the button with the Moon symbol.

After you set the filter criteria, the search process is carried out with a click on *Search*. All objects found by E&T are displayed in a list on the right

side of the window. By clicking a column heading the list is sorted in ascending or descending order. A right-click on a list row brings up a context menu with a selection of further information and functions. <F1> opens the help file, which explains each list column and the operation of the object filter.

Short-term observing plan or long-term observing project?

If you want to prepare for an upcoming night, E&T helps you design an *observing plan*. There you insert objects and plan the timing of the observations. You also have the option of generating a printable HTML document containing all the vital information.

E&T can also monitor *observing projects* that require long-term planning, (e.g. observing every Caldwell object). Here you work on a list rather than general observing for the upcoming night. The observing project primarily identifies as-yet-unseen objects attainable under the given conditions (time and site, sky and optics) and chronicles the progress

of your observations (recorded in the logbook).

The hit list of the object filter may sometimes be quite long. Contrast above threshold and *optimal time* can help you pick the best candidates for a particular observing session. You'll get an impression of how an object should look in the eyepiece of your telescope by right-clicking its row in the hit list of the object filter. Then select the function *Perception* in the context menu. E&T opens a window with object information. You can change limiting magnitude and optics settings in the upper area and see how this directly affects perception. Trying various limiting magnitudes is particularly interesting!

The dialog box **Catalog Data**

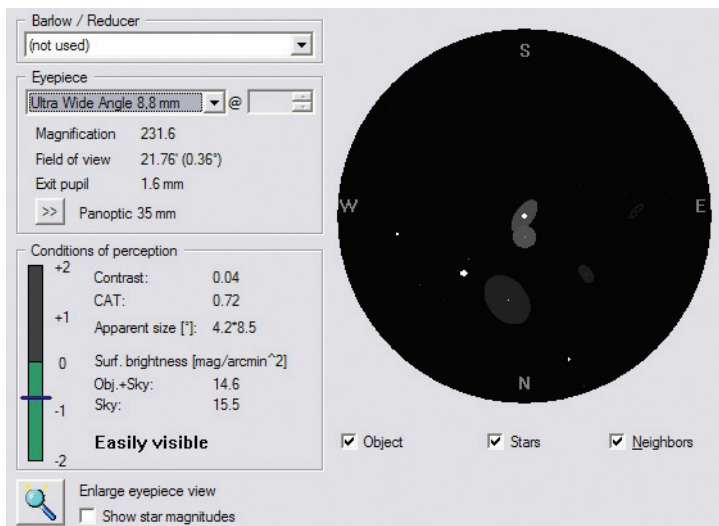


Fig. 5: Simulated eyepiece view

shows database information. In *Visibility* you can see and plan around the position of the object in the sky, and in *Notes* you can enter remarks on the object. Press <F1> for further explanations.

Let's create an *observing plan* and insert some objects. The window with the object information represents an observing plan containing only one object, not yet added to a list. With a click on the *Insert* button next to the entry field for the name, you add the object to the observing plan. To add further objects, you enter their names and repeat the process. The list of the objects contained in the plan can then be seen on the left side. To display information about an object in the plan, simply click on the list entry of the desired object. Be sure to check out a right-click as well!

Typing their names is not the only way to add objects to an observing plan. E&T supports clipboard (*Copy* and *Paste* functions in the *Edit* menu) and drag-&-drop (drag objects from one window to another while holding the left mouse button down) capabilities. This makes it a snap to move objects from an object filter to an observing plan. The context menus in the various E&T lists also support clipboard or drag-&-drop operations that move the current object to any E&T window, with one exception. No objects can be inserted in the object filter because its choice of objects is solely determined

by the filter settings. The filter is therefore the source of objects, which then can quite comfortably be transferred to observing plans, observing projects, star maps, and the logbook. These possibilities for data transfer and program navigation are represented in this manual's centerfold illustration. See also the hints in the section "Shortcuts for selecting objects."

When all desired objects are added to the observing plan and a suitable observing time for each object is set up, the plan is complete. You may find that the best time for viewing several objects occurs at the beginning or end of twilight. Because this is not practical, E&T offers the *Extras.Optimize for Time* function to adjust the plan. For help-file details, press <F1>.

If required, you can generate an observing plan as an HTML page for printout from your browser. Choose the *File.Export.HTML pages* menu item for this. A dialog with various options allows you to modify the layout and scope of the represented data. A paper printout is handy if you'd like to leave your notebook computer at home – especially in winter.

An observing project is a planning document where you first insert the objects of interest and which then helps you with sort and calculation functions to purposefully carry out the intended observations. After updating site, date,

optics, and limiting magnitude, click on Recalculate CAT and Best Time and the project will show you which objects are up for observing at what time. You can mark objects in the list (see "Shortcuts for selecting objects") and add them to an observing plan with the function File.Create Observing Plan.

You can insert objects into an observing project with the help of the clipboard

and data exchange functions of E&T (File. Copy / File.Paste or drag & drop between visible windows), or you can or directly add objects by name. Functions of the context menu, which you open with a right-click, quickly and easily get you to object information from the catalog, the simulated eyepiece view, or to the log-book where you can immediately record your observations.

Shortcuts for selecting objects

In some E&T object lists, you can select an assortment of several objects on which a function will be performed. For example, you can select some objects in the hit list of the object filter to add them to an observing plan with the File.Create Observing Plan function. Knowing some keystrokes (which work the same way in other Windows applications) simplifies the operation of E&T considerably. If several keys are mentioned in the list below, then these keys must be pressed one after the other and *kept pushed down*.

- You select a contiguous range of rows in a list by selecting the first entry and keeping <Shift> pushed down when selecting the other end.
- You can select non-contiguous list entries by selecting them while holding down the control key <Ctrl>.

- The key combination <Ctrl> <Home> moves the input focus to the top of the list.
- The key combination <Ctrl> <End> moves the input focus to the bottom of the list.
- Use the key combination <Shift> <Ctrl> <Home> (press one after the other and hold down) to select all entries from the currently highlighted row up to the top of the list.
- Use the key combination <Shift> <Ctrl> <End> (press one after the other and hold down) to select all entries from the currently highlighted row down to the bottom of the list.
- To mark all rows of the list, select the first entry and then push <Shift> <Ctrl> <End>.

The filter criteria available in the object filter can't formulate my choice. What can I do?

You might try to find a set of observing targets with the object filter, but discover that there are no suitable filter criteria. For instance, this happens when the sought-after set of objects consists of subsets that can't be described with the same filter settings (e.g. "all dark nebulae in the northern sky, all quasars brighter than magnitude 14, and the globular clusters in Ophiuchus with a minimum contrast above threshold of 0.3). It also occurs if you want to filter according to traits for which there is no filter criterion (e.g. "large diameter no more than 10 arc minutes").

When this happens, you can use one or more observing projects to "park"

the filter results for each subset. Use the `File.Create Observing Project` function to add all or only the selected rows of the filter results to a new project. The objects in the individual observing projects can be sorted according to their properties by clicking the relevant column headings. Objects not fulfilling a given criterion (such as large diameter or atlas chart number) can then be marked and deleted (see Selection of objects in lists "Shortcuts for selecting objects").

Once the subsets of the search result are prepared as single projects, you can combine them with the aid of the clipboard or drag-&-drop and save the compiled project under your desired name. Project files used for the subsets as a parking lot can be closed without saving.

How can I add a new observing target to E&T?

If you'd like to observe an object that isn't stored in E&T's catalog database, you can add it yourself. For this task, use the function `User Data.Obj-`

`jects` It can be summoned with `<F2>` anywhere in the program. If you need an explanation of a field to be filled out or selected, click on the field and press `<F1>`. The help file will open and offer clarification.

How can E&T help me with unprepared observing sessions?

If you're observing without preparation, you'll mostly be interested in suggestions for potentially observable objects. The object filter can help. With only the current settings for site and date, the selection of optics used, and an estimate of the current limiting magnitude, you'll usually find a multitude of objects. To achieve a smaller set, you can sort by the contrast above threshold to pick out objects that aren't too difficult, or you can sort by optimal time to select good targets for the observing interval (which won't usually span the entire night). Another approach is to use the `Edit.Find Best Objects` . . . function to limit the star map to the optimum targets. To get an impression of how an object will look, call up the `Perception` function in the context menu for any object

plotted on the map. If the object seems interesting and you successfully observe it, you can record the observation in the logbook right away by opening the logbook from the context menu. Used this way, the star map serves both as a guide and as a "graphic observing plan."

If you have prepared observing projects, you can first update the project settings for site, date, optics, and limiting magnitude, then apply `Recalculate CAT and Best Time`, and finally bring unobserved objects to the top of the list by clicking the "Last observation" column. An object is a suitable target if the "Best time" listed for it is acceptable. With one or several observing projects (preferably prepared using additional information sources such as observer's guide books or magazine articles) you'll never run out of ideas when observing spontaneously.

Support during the observation

Night vision mode

Now let's look at how E&T supports you during observing sessions. When using a computer at the telescope, it is important to preserve your dark adaption. E&T offers a *night vision mode* to which you can change with the `View.Night Vision Mode` command. However, you

should also use an additional screen filter made of deep red Plexiglas or transparent film. Film filters (often called gels) may be in stock at a theater supply shop, stage lighting store, or music store that sells lighting equipment. They can also be ordered via the Internet; try searching on the phrase "lighting gels."

Star maps

E&T offers star maps to help you with orientation at the telescope. The maps use the equatorial coordinate system just as printed star atlases do. Since they are not needed for star hopping, horizon coordinates are not supported by E&T. E&T's star maps are focused on the perceptibility of objects. A star map created with `File.New` or from the context menu of a list does not show any objects at first. The objects relevant for you can be transferred to a map using standard clipboard or drag-&-drop capabilities. Or, you can leave the task of finding perceptible targets to E&T with a fairly "compact object filter" – the `Find Best Objects...` function, which can be called up from the context menu of the star map display. This avoids cluttering the maps with unnecessary information.

For convenient nightly operation at the telescope, a scroll-wheel mouse is highly recommended!

Shortcuts in star maps

- Use arrow buttons to pan the display
- `<Ctrl>+ arrow` buttons for panning in smaller steps
- `<Page Up>` for counter clockwise rotation
- `<Page Down>` for clockwise rotation
- `<Home>` for position angle = 0° (north up)
- Number button `<0>` for overview
- Number buttons `<1>` to `<9>` for corresponding map levels
- `<Return>` or `<Enter>` key: discard objects on the map and call up the `Find Best Objects...` function
- Hit `<Return>` or `<Enter>` twice to repopulate the map

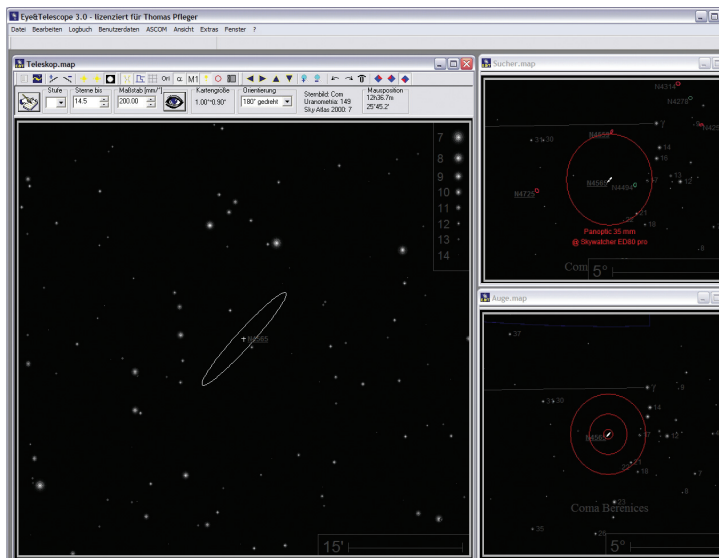
Functions of the mouse in star maps

- Left click: Center on the mouse position
- Right-click: open the context menu
- Mouse wheel upward: zoom in to the next higher level
- Mouse wheel downward: zoom out to the next lower level

To provide the star maps with as much screen space as possible, you can maximize the map window and get rid of the main menu and window frame with `View.Full Screen Mode` or `<F12>`. The full screen mode is disabled with another `<F12>` or `<Esc>`. The controls shown in the upper pane of the map window can be hidden (and

brought back again) when required by pulling the splitter bar between the control pane and map pane up or down.

E&T can display several star maps at the same time. With the synchronization of maps (described in the help file), each map is centered on the same position. Typically a setup of three maps is used showing a naked eye overview, the finder scope perspective, and the main optic's field of view (with appropriate scales and limiting magnitudes). Each panning of the view in one of the map windows then causes immediate update of the other windows. You can use *workspaces* (details in the help file) to permanently store the layout of the windows. There is a special function for printing finder charts (see the help file).



Telescope control

Observing with E&T is particularly trouble-free if you have a computer-controllable telescope for which an ASCOM-compatible driver is available. E&T then offers the menu title `ASCOM`, where you select a suitable driver first and can establish a connection to the scope afterwards. When connected, E&T shows the current position of the telescope on the star maps and allows for positioning with the `GOTO` command that can be called up from the context menu of planning documents.

Logbook

E&T features a logbook with which you can readily document your observations. Observations of solar system bodies as well as other objects or phenomena acquired by the user may also be recorded.

You can open the logbook with `Logbook.Entries` and record an observation with `New`. Recording an observation is even easier with the `Create Log Entry...` function (available in the context menu of every planning document) which transfers parameters for the current object to the new entry. In the logbook, the keyboard is required only for entering the text to describe your observations. If you don't want to struggle with typing in the dark, you can use a dictation device and include your descriptions in E&T later. For explanations of the logbook's various fields, click on the field in question and press <F1>. The *file links*, with which arbitrary files (e.g. pictures) can be referenced, provide a noteworthy logbook capability. E&T merely stores the path, but not the contents of these files. For details click on the `Links to Files` dialog box and open the help file with <F1>.

Filing information in the logbook that applies to all of a night's observations (e.g. comments on the weather) can be accomplished with *sessions*. A session refers to a given time period and site

and automatically references all observations applicable to it.

You can find given observations in the logbook by using the log filter, which is invoked with the `Filter Settings...` function in the observations window.

E&T incorporates the logbook entries in several places:

- You can search specifically for objects already observed or not yet observed in the object filter
- The date of the latest observation of an object is shown in observing projects
- In star maps, objects that have already been observed can be plotted and are visibly highlighted
- Existing logbook entries for objects may be opened with the `Open Logbook` function available in the context menu of planning documents.

If you want to make your logbook accessible to other observers, you can store it wholly or as an excerpt (after applying the log filter) as an HTML file by using the `File.Export` function. The layout of the generated page is controlled by an XSL stylesheet that allows for customization by users with a sound knowledge of XML and XSLT. Direct export as an XML file can be used to share observations with other users who can import such files.

How does E&T cooperate with other software?

E&T uses the database format of *MS Access 2000*, which enables trained users to create reports from or make special queries of the logbook data. This also gives you the ability to use your data independently of E&T.

A central feature of E&T is its clipboard support. If the names of objects are put on the clipboard, the program can then insert these objects in observing projects or plans and in star maps, providing the object names are in the catalog (E&T's object database).

Possible applications of this function include:

- Data transfer from Excel: Mark a cell range in Excel that contains object names. Copy the selection into the clipboard or drag-&-drop the selection directly onto an E&T planning document.
- Data transfer to Excel: If you copy selected objects from an object filter or observing project to the clipboard, E&T not only puts the names but all of the object data there. The data can then be inserted in an Excel worksheet.
- Display of object information on object names shown in a Web browser or another Windows application: Copy the object name in the browser or the software to the clipboard. Switch to an E&T ob-

serving plan and paste the object stored on the clipboard. Provided that E&T recognizes the name, you can either check the perceptibility of the object with your optics or add the object to a planning document at once. Thus, you can use E&T in conjunction with many common astronomy programs and seamlessly augment their utility with E&T's special features.

E&T can control most common star-mapping software. You can have the software display a map centered on an object selected in E&T with a simple command. This ability takes into account the fact that most amateur astronomers already have powerful star-mapping software, to which E&T makes a perfect supplement. Some external programs support special functions. Refer to the help file for details (see General functions / Planetarium software support).

You can select various file formats when storing star maps with the `File.Save As...` command. In addition to the common bitmap formats, maps can be saved as vector graphics (Windows metafile). Many graphics programs can read this format, thus allowing processing of the star maps.

Log entries and observing plans can be saved as HTML pages. This simplifies placing your documents on web pages or passing them along to friends.

If you have a PDA, you can load an observing plan saved in HTML into the device for convenient portability. For the "Astromist" PDA application by Cyrille Thieuliet, a special export function is available.

XML export of observations opens up far-reaching possibilities. The data format is easy to process for applications as well as being platform and program-independent. An import function for XML data enables the exchange of observations with other users of the software. Since the development of this data format is an international effort, further applications (such as a web database) may be realized in the future. The ASCOM Initiative is a group of several astronomy device manufacturers and software developers. Its aim is to

bring about compatibility between astronomical software programs and telescope equipment from different vendors. The ASCOM platform contains a set of common interfaces, engines, and tools to interface software with the ASCOM-compatible drivers now found in most astronomy devices that connect to computers. It can be used by E&T and numerous other astronomy programs. See www.ascom-standards.org for details.

E&T can establish a connection to compatible mounts via the ASCOM interface, which can indicate the current telescope position on maps or (with the necessary hardware) slew the telescope to an object's position. For details please see the help file (General functions / Telescope control).

Where and how does E&T store my data?

E&T saves the license data and program settings in the text file `ET.ini` and uses three databases in the format of MS Access 2000:

- `Userdata.mdb` contains the user data, observations in the log-book, and the data on observing targets acquired by the user.
- `Catalog30.mdb` contains data (which can be browsed with the object filter) on observing-project lists and those entries acquired by the user
- `ET_Sys30.mdb` holds information necessary for the operation of the software, but not of interest to the user.

The names (and their abbreviations) of object catalogs selectable in the object filter are read from the file `Catalogues.xml`. If you'd like to add a catalog name, you can edit the file

with a text editor. The structure of the entries must be exactly adhered to, since otherwise the complete file isn't processed.

The data on user acquired observing targets are stored in `Userdata.mdb` in addition to `Catalog30.mdb`. After a re-installation of the software from the CD, the observing targets you acquired before will be missing from the catalog. These can be restored to the catalog from `Userdata.mdb` with the `UserData.RestoreUserData` function.

You only need the `ET.ini` and `Userdata.mdb` files to backup your data. When you end the program, E&T copies these two files into a directory which you can specify under `Tools.Options`. The installation directory is not suitable for this! An occasional backup of the files on an external storage medium is recommended.

How can I use E&T on several computers?

If, for example, E&T is used at home on a desktop computer and on a notebook computer for outdoor use, you can transfer user data (log entries; data for sites, optics, and eyepieces) acquired on one computer to the other one.

- New user data or log entries are always *created on only one computer*. Logging or altering data independently on several computers must be avoided!
- When finishing a session where new user data is acquired, quit E&T on all computers and copy the file `Userdata.mdb` from the source computer (with the latest modifications) to the other (target) computer.

- Start E&T on the target computer and execute the `Userdata.Restore Userdata` function. This is offered in the menu only when no document windows are open.

When required you can also use this procedure with more than two computers. It is important that modifications carried out on one computer are distributed as described above to all other computers before modifications to the user data or logbook take place.

Recommended reading

- Astronomy Hacks, Robert H. Thompson and Barbara F. Thompson, O'Reilly Media
- Deep Sky Observing - The Astronomical Tourist, Steven R. Coe, Springer-Verlag London
- The Night Sky Observer's Guide (Vol. 1 & 2), George R. Kepple and Glen W. Sanner; (Vol 3), Ian Cooper, Jenni Kay, and G. R. Kepple; Willmann-Bell
- Atlas of the Messier Objects, Ronald Stoyan, Cambridge University Press



www.eyelandtelescope.com